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KNOWLEDGE AND PRACTICES OF STAFF NURSES IN THE PREVENTION IV CANNULATION COMPLICATIONS AT ISRA UNIVERSITY HOSPITAL, HYDERABAD.

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ABSTRACT

Intravenous (IV) cannulation is a common medical procedure, but complications such as phlebitis and infiltration can lead to significant patient harm if not properly managed. This study aimed to assess the knowledge and practices of staff nurses in the Prevention of IV Cannulation Complications at ISRA University Hospital, Hyderabad. A descriptive cross-sectional study was conducted from July to September 2024, with 70 nurses selected through non-probability convenience sampling. Data was collected using a structured questionnaire, and analysis was performed using IBM SPSS Statistics Version 23. The results indicated that most nurses had good knowledge of major complications like phlebitis and infiltration. While nurses adhered well to key practices such as selecting the correct cannula and maintaining sterility, there was moderate adherence to monitoring practices post-insertion. The study highlights the need for enhanced training, especially in the early detection of complications, to further improve patient safety.

Keywords: IV Cannulation, Phlebitis, Infiltration, Knowledge, Practices, Staff Nurses, Prevention.

INTRODUCTION

An intravenous (IV) cannula is a medical procedure used on hospitalized patients to obtain blood samples centrally or peripherally and to provide drugs, fluids, and nutrition (Dessalegn et al., 2024). Over 90% of patients admitted to hospitals are given intravenous medicines. Despite being widely used, IV cannulation can cause complications. Infiltration, venous thrombosis, phlebitis, discomfort, infection, and bleeding are the most common complications (kadham Hussin & Essa, 2023). Poor medical procedures for inserting, maintaining, and removing the IV cannula frequently lead to these problems (Siddique, 2023). Around 98.8% of IV cannula-related infections are preventable with appropriate nursing care and adherence to established guidelines. However, despite the efforts of organizations such as the Centers for Disease Control (CDC), which has developed guidelines for the prevention of IV-related infections, these complications remain a major public health issue, affecting patient health and the overall quality of

healthcare (Essa, 2023; Yang et al.). Peripheral IV cannulation is one of the most critical responsibilities of a hospital nurse. It is the most common method for administering fluids, blood products, and medications such as those used for chemotherapy or transfusions (Patidar, 2022). Whether a patient is being treated in an emergency department or admitted for long-term care, intravenous therapy plays an essential role in their treatment. However, IV cannulation carries a significant risk of complications, including superficial phlebitis and infiltration, which can exacerbate patient pain and potentially delay treatment or lead to unfavorable outcomes if left untreated(Ali & Saud, 2021; Siddique, 2023).

Infiltration occurs when the therapeutic substance leaks outside the vein, causing damage to surrounding tissue. The skin around the infiltration site becomes paler and stiffer compared to the surrounding area(Ali & Saud, 2021; Patidar, 2022). This complication is often caused by improper technique during catheter insertion or maintenance. Nurses can prevent infiltration by ensuring the needle remains properly positioned within the vein before administering medication (Behairy et al., 2023). In cases where the needle may have become displaced, blood must be drawn again to confirm proper placement before proceeding with the injection. Early detection and intervention, such as the use of cold compresses and anti-inflammatory medications, are crucial in minimizing the impact of infiltration (Mohamed Bayoumi et al., 2022). The complication most often reported with IV therapy is phlebitis, which is defined as inflammation of the vein, usually from local trauma resulting from catheter placement. It can also be seen more often in patients who are provided with repeated cannulation (Dey & Madhumathi, 2024; Siddique, 2023). This condition is usually characterized by inflammation that comes with burning or pain along the vein and once left uncontrolled, it might cause an infection. To avoid phlebitis, the area where the cannula is inserted should be washed before each injection and for any erythema, edema, or pain around it, the cannula should be removed (Aminullah et al., 2023). In addition, to minimize the chance of complication, non-emergency cannulas should be removed within 48 to 72 hours of their placement; therefore, the insertion date as well as the time is crucial to document (Dey & Madhumathi, 2024). Though these are the recognized complications, any efficient nurse, with prior training, is fully capable of avoiding and handling such incidences. They must adhere to prevailing norms including placing a transparent, sterile dressing to cover the cannula's base making sure that the insertion site is observable, and never using a non-sterile dressing on top of the cannula site (Goda Elbqry, 2024). Nurses should be able to identify any associated changes in the patient's condition and manage them to prevent further anguish to the patient (Hernon et al., 2024). Nurses' knowledge, practice, and attitudes are central to IV-related complications prevention. The purpose of this study is to assess the knowledge and practices of staff nurses in the prevention of IV cannulation complications at ISRA University Hospital, Hyderabad. To improve patient care and lower IV cannulation-related issues, it is critical to assess nurses' training in these areas and identify any knowledge or practice gaps.

RESEARCH OBJECTIVE

To assess the knowledge and practices of staff nurses in the prevention of IV cannulation complications at Isra University Hospital, Hyderabad.

MATERIAL AND METHODS:

This study was cross-sectional and was carried out at the Isra University Hospital in Hyderabad. The research was conducted from July to September of 2024. The target population consisted of staff nurses working in different departments, including Emergency, ICU, Medicine, Surgery, and Gynecology. A non-probability convenience sampling technique was used to select a sample of 70 staff nurses. IBM SPSS version 23 was used for the analysis of the collected data. Standard deviations, means, percentages, and frequencies are utilized in descriptive statistics.

Inclusion and Exclusion Criteria:

Inclusion Criteria:

All staff nurses, both male and female, who consented to take part and present within the time frame for collecting data.

Exclusion Criteria:
Staff nurses who weren't accessible when the data was being collected.
The nurses who declined to take part.

Tool of the Study:
The structured questionnaire was used to meet the study's objective. It is divided into three sections:

Section A: Socio-demographic data (age, gender, marital status, work area, and years of experience).
Section B: Knowledge assessment consisting of 10 questions to evaluate nurses' knowledge of IV cannulation complications.
Section C: Practice assessment with 10 questions related to the nurses' daily practices when performing IV cannulation.

RESULTS

TABLE 1: DEMOGRAPHIC ANALYSIS
(n=70)

Variable	Category	Frequency (n)	Percent (%)
Age In Years	20-25 years	50	71.43%
	26-30 years	13	18.57%
	31-35 years	3	4.29%
	36 and Above	4	5.71%
Gender	Female	58	82.8%
	Male	12	17.1%
Years of Experience	Less than 1 year	40	57.1%
	1-5 years	22	31.4%
	5-10 years	5	7.1%
	Above 10 years	3	4.2%
Area of Working	Gynecology	2	2.8%
	Intensive Care Unit	19	27.1%
	Medicine	15	21.4%
	Surgery	6	8.5%
	Others	28	40%

The majority of participants were aged 20-25 years (71.43%, n=50), with 18.57% (n=13) in the 26-30 years age group. Most respondents were female (82.8%, n=58), and 57.14% (n=40) had less than one year of experience. In terms of work areas, 40% (n=28) were from "other" areas, followed by ICU (27.1%, n=19), Medicine (21.4%, n=15), Surgery (8.5%, n=6), and Gynecology (2.8%, n=2).

TABLE 2: KNOWLEDGE OF THE STUDY PARTICIPANTS
(n=70)

Statement		Yes	No	Don't Know	Mean	St. Devi.
The term superficial phlebitis describes a minor, area-specific inflammation.	Freq	54	11	5	1.30	.598
	%	77.1%	15.7%	7.1%		
Phlebitis arises from the use of a contaminated cannula.	Freq	57	12	1	1.20	.437
	%	81.4%	17.1%	1.4%		
Vein irritation can occur from some drugs and highly acidic fluids.	Freq	60	5	5	1.21	.561
	%	85.7%	7.1%	7.1%		
When a cannula is left in place for longer than 72 hours, is there an increased risk of phlebitis?	Freq	59	6	5	1.22	.569
	%	84.3%	8.6%	7.1%		
Vein infiltration and phlebitis are dangerous illnesses that can cause blood clots and put a patient's life at risk.	Freq	60	7	3	1.30	1.25
	%	85.7%	10%	4.2%		
Using the appropriate cannula size for the patients reduces	Freq	58	8	4	1.22	.542

infiltration.	%	82.9%	11.4%	5.7%		
Rapid intravenous fluid administration causes infiltration.	Freq	53	10	7	1.34	.656
	%	75.7%	14.3%	10%		
Choosing the appropriate vein essential for preventing complications?	Freq	62	7	1	1.12	.377
	%	88.6%	10%	1.4%		
A failing attempt of IV cannula leads to infiltration and phlebitis.	Freq	46	18	6	1.42	.649
	%	65.7%	25.7%	8.6%		
It is possible to lower the risks by teaching the patient about the symptoms of infiltration and phlebitis.	Freq	56	11	3	1.24	.522
	%	80%	15.7%	4.3%		

The table shows that the majority of participants recognized superficial phlebitis (77.1%), the risks of using contaminated cannulas (81.4%), and the impact of acidic medications on veins (85.7%). The mean score for these statements ranged from 1.12 to 1.34, with standard deviations from 0.377 to 0.656, indicating relatively consistent knowledge among participants. Most also knew that leaving a cannula in place for over 72 hours increases phlebitis risk (84.3%) and that both phlebitis and infiltration can be life-threatening (85.7%). Infiltration risk was understood to be reduced by using the correct cannula size (82.9%). Selecting the right vein was considered important by 88.6% of participants. However, fewer participants (65.7%) recognized that failed cannulation attempts can lead to complications.

TABLE 3: PRACTICE OF THE STUDY PARTICIPANTS (n=70)

Statement		Always	Sometimes	Never	Mean	St. Devi.
Inspect the cannula site for the first ten minutes.	Freq	47	21	2	1.35	.539
	%	67.1%	30%	2.9%		
Remove the IV cannula immediately if there are any signs of infection or infiltration.	Freq	46	19	5	1.41	.625
	%	65.7%	27.1%	7.1%		
Place the tourniquet 10 cm above the vein.	Freq	52	17	1	1.27	.479
	%	74.3%	24.3%	1.4%		
Use the proper cannula for a particular patient.	Freq	59	8	2	1.31	1.25
	%	84.3%	11.4%	2.9%		
Apply a hand gel with alcohol.	Freq	59	9	2	1.18	.459
	%	84.3%	21.9%	2.9%		
To ensure proper installation, insert normal saline solution into the cannula.	Freq	54	14	2	1.25	.501
	%	77.1%	20%	2.9%		
Sterilized the cannula's location in a particular direction using alcohol.	Freq	55	13	2	1.24	.494
	%	78.6%	18.6%	2.9%		
Replace the tape as soon as it becomes moist.	Freq	50	18	2	1.31	.525
	%	71.4%	25.7%	2.9%		
Instruct the patient about the signs and symptoms of phlebitis or infiltration.	Freq	52	14	4	1.31	.578
	%	74.3%	20%	5.7%		
On the site cannula, write the time and date.	Freq	60	10	0	1.14	.352
	%	85.7%	14.2%	0%		

The table displays the participants' practices regarding IV cannulation. Most nurses consistently followed best practices in IV cannulation. The majority of participants (84.3%) always used the appropriate cannula size for the patient, applied alcohol hand gel (84.3%), and pushed normal saline to ensure correct cannula placement (77.1%). Regarding other practices, 78.6% consistently sterilized the cannula insertion site with alcohol in one direction, while 71.4% always replaced the tape when it became wet.

Additionally, 74.3% always informed patients about the symptoms and signs of infiltration or phlebitis, and 67.1% observed the cannula site during the first 10 minutes after insertion. The mean scores for these practices ranged from 1.14 to 1.41, with standard deviations from 0.352 to 1.25, indicating a generally high level of adherence to recommended practices. However, writing the date and time on the cannula site was the most consistently practiced task, with 85.7% of nurses always performing it. Conversely, only 2.9% reported never observing the cannula site in the first 10 minutes.

DISCUSSION

Results of this study reveal that nurses were able to identify key aspects of IV cannulation, including superficial phlebitis (77.1%); risks of contaminated cannulas (81.4%); and the importance of selecting the correct vein (88.6%). This aligns with the findings of recent studies as revealed by (Dessalegn et al., 2024; Kamaruzaman et al., 2024) which showed that a majority of the nurses had a satisfactory level of knowledge on IV-related complications and preventive measures including phlebitis and infiltration.

Similarly, 79% of nurses were aware of the possible risks associated with cannulation, specifically the possibility of phlebitis if a cannula is left in place for an extended period(Essa, 2023). However, only 75.7% of participants correctly identified fast fluid administration as a potential cause of infiltration, indicating a significant lack of knowledge about its effects. This conclusion is in line with (Behairy et al., 2023; Sari et al., 2024), They noticed a similar pattern: nurses were less knowledgeable about the more minor factors that contribute to infiltration, like the rate of infusion.

Although nurses were knowledgeable about the main concerns, but displayed a less thorough knowledge about the more minor ones, for instance, the effect of fluid infusion rate (Atay et al., 2023). Regarding practice, the study's findings demonstrated a high degree of compliance with recommended practices.

To maintain sterility, the majority of nurses (84.3%) stated that they always used the right size cannula for the patient and applied alcohol hand gel. These results are similar to research conducted by (Assefa et al., 2021; Dessalegn et al., 2024), where response rates of over 85% indicated that using alcohol hand gel and making sure the cannula size was appropriate were among the most frequent practices.

To preserve the cannula's cleanliness and security, the study also found that 71.4% of nurses consistently changed the tape when it became moist. This result aligns with (Maharjan et al., 2020) who stated that 70% of nurses followed this protocol. Nevertheless, there are signs of improvement concerning some practices such as monitoring the site for complications by the results of this study. According to (kadham Hussin & Essa, 2023; Santos-Costa et al., 2022) early monitoring is crucial in reducing problems, although only 67.1% of participants consistently viewed the cannula site within the first 10 minutes. Remarkably, only 57.1% of the nurses always documented the date and time that the cannula was inserted which is useful in avoiding long dwell times and the subsequent risk of phlebitis. This finding agrees with previous research studies conducted by (Bayoumi et al., 2022; Smith et al., 2024) which stated that correct documentation contributes to the reduction of IV-related complications; however, some of the nurses in the current study indicated that they sometimes fail in this area. The study shows that, in general, the sample practices noble standard levels; however, the study also underlined the aspects that might be improved with further training.

More care is specifically needed to detect modest indications of infiltration and to monitor for problems (such as phlebitis or infiltration) within the first 10 minutes after insertion.

These findings are similar to those of other studies (Figueiredo et al., 2024) (Bahl et al., 2023) The authors found that even though there is awareness

concerning IV-related complications, a lack of routine assessment early after the insertion of the IV catheter might lead to a delayed identification of complications. This is especially important because if phlebitis and infiltration are not recognized and managed in the initial stages they can progress to more serious conditions such as extravasation and tissue necrosis.

CONCLUSION:

Therefore, the study concluded that most of the nurses demonstrated good knowledge of major complications such as phlebitis and infiltration as well as compliance with practices such as choosing appropriate cannula size and maintaining sterility. Nonetheless, there was a moderate level of compliance with practices including post-insertion cannula site monitoring. Standardized processes for monitoring and continuous training are advised to improve practices and promote the timely identification of complications.

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Disclosure/Conflict of Interest

For this research, there was no identified conflict of interest. There was no funding involved in this study.

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